vaults in nearly every street in our crowded towns, still the pavement is not rendered insecure; and as frequently does an aperture (to use a bull) form the apex of a dome.

Yours respectfully, W. W.

[We do not believe that the vaulting of King's College Chapel is formed in any such manner as our correspondent imagines; if it had been so formed, it would long since have fallen, from the pressure in every joint of the work being false. Admirable as is the work of King's College vaulting, with the pressure operating at right-angles to each of its component stones, still the soffit of the vaulting has in places opened at its keel-rib or summit by the dropping of the work, so as to hold at the upper angles of the voussoirs. A work so thin as the King's College Chapel vaulting, if it had been only corbelled over throughout the work, would on the removal of the scaffolding immediately after its erection, have pulverized itself in every part: the pressure being askew in every joint, all the angles of the stones would have "*spaulched*" off, and their total ruin would have ensued. Our correspondent is entirely mistaken on the subject of the corbels, for these were formed in early times in order to increase the weight of the abutment, and preserve it from being cut into (and weakened) for receiving the vaulting,—to diminish the span,—and to lighten the work in jeopardy. Many architects and mathematicians consider an arch to consist of a series of key-stones, and the term so applied is not worth questioning; no arch is finally locked by what is vulgarly termed "*the* key-stone," yet removal of any one voussoir would sufficiently unlock an arch to cause its ruin. We are certain (although now the work is old perhaps the great bosses of King's College Chapel vaulting might be removed without the vaulting falling into immediate ruin), that ultimately such would be the case, and that if the vaulting had been originally built without them, the work would have become crippled instantly on the removal of the centering. Holes left in ordinary coal-vaults in no way apply to the case, for these have usually circular rims worked round them; and leaving out the crown of a dome, which is the mischievous part of the work, is the mode which has been practised by the most skilful artists. Study, observation, mathematics, and practical experience will cause our correspondent to reverse most of his present opinions. THE MATERIALS OF NO VAULTED EDIFICE WILL STAND AS THE ARCHITECT DESIRES THEY SHOULD, UNLESS, IF THEY WERE ALL SUSPENDED IN AN INVERTED POSITION, THEY WOULD RETAIN EVERY CURVATURE, FORM, AND POSITION UNALTERED (MERE INVERSION EXCEPTED). Of this, however, more hereafter. —ED.]

DESCRIPTION OF A WROUGHT-IRON LATTICE BRIDGE, LATELY ERECTED ON THE LINE OF THE DUBLIN AND DROGHEDA RAILWAY.

BY O. W. HEMANS.

(*Read before the Institution of Civil Engineers, January 9.*)

THIS kind of bridge is stated to have been first used in America, where timber being so abundant, the lattice sides are formed of that material, and consist simply of planks three inches thick, crossed so as to form deep beams, and secured with oak trenails at all the intersections.

The bridge described in this communication, is situated about three miles from Dublin, over an excavation of 36 feet in depth; its span is 84 feet in the clear, and the two lattice beams are set on edge parallel to each other, resting at either end on plain stone abutments built in the slope. These beams are 10 feet in depth, and are formed by a series of flat bars of wrought-iron, 2¼ inches wide and ⅜ inch thick, crossing each other at an angle of 45°. At a height of 5 feet 6 inches above the bottom edge, transverse bearers are placed, formed of ⅜ inch angle-iron, 6 inches deep, and set 2 feet apart, similar to the cross-ties now used for the decks of iron steam-vessels, and upon these the planking for the roadway is fastened.

The account of the mode of construction, and of the raising and fixing the lattice-beams, by Messrs. Perry, of Dublin, the contractors, is given in detail.

The author states that some deflection or sagging of the lattices was expected, and was provided for by constructing each of them with a camber or gradual curve from the ends, amounting to 12 inches in the centre; but that far from such being the case, they did not sink even when heavy weights passed over them.

The total cost of the bridge, including the masonry of the abutments, was 510*l*.

The paper is illustrated by a drawing (No. 3408), shewing the elevation and the details of the construction of the bridge.

Major-General Pasley had seen and approved of the bridge; it appeared to be on a good principle, and was well constructed. He understood that it had been Mr. Macneill's intention to have a model made of a viaduct of 230 feet in length, with a central span of 140 feet, which he had designed for carrying the Dublin and Drogheda Railway across the Royal Canal in an oblique direction, but he now considered that the bridge which had been described was better than a model; and as it had borne, with only a slight deflection, a loaded waggon weighing 22 tons, and all other tests to which it had been submitted, he had decided upon building the larger bridge upon the same principle.

Captain Moorsom thought that the bridge was too expensive, and that if the lattice sides had been 8 feet 6 inches in depth, they would have been quite strong enough. In the timber bridges of the same construction in America, any tendency to either flexibility or buckling was obviated by placing several ranges of lattices side by side, and the custom of roofing the timber bridges of that country also gave additional strength laterally. The timber bridges on this principle which he had constructed on the Birmingham and Gloucester Railway (one of which was 160 feet span, and the others between 90 and 120 feet span), varied in cost from 4*l*. to nearly 6*l*. per running foot, according to the span, the larger spans being proportionally less expensive than the smaller. Materials and labour were dear at the time of constructing the bridges alluded to.

It was stated that the original inventor of the lattice bridge was the late Mr. Smart, by whom it was patented. It is mentioned in Dr. Gregory's "Mathematics for Practical Men," p. 231.

NARROW WINDOWS.

TO THE EDITOR OF THE BUILDER.

SIR,—I send you the annexed sketch of a window designed for a small church, the form of the upper light, and the way the stone sill terminates, being, I believe, without a precedent.

The part *b*, *b*, *b*, *b*, is one solid stone checked, so as to be on a line with the face of the wall; the cross is formed in a panel, the centre narrow space being cut through and communicating with a flue ending at the window-board or flag in the interior, for the purpose of ventilation. The admission of air is regulated by means of a lid fixed to the window-flag inside.)

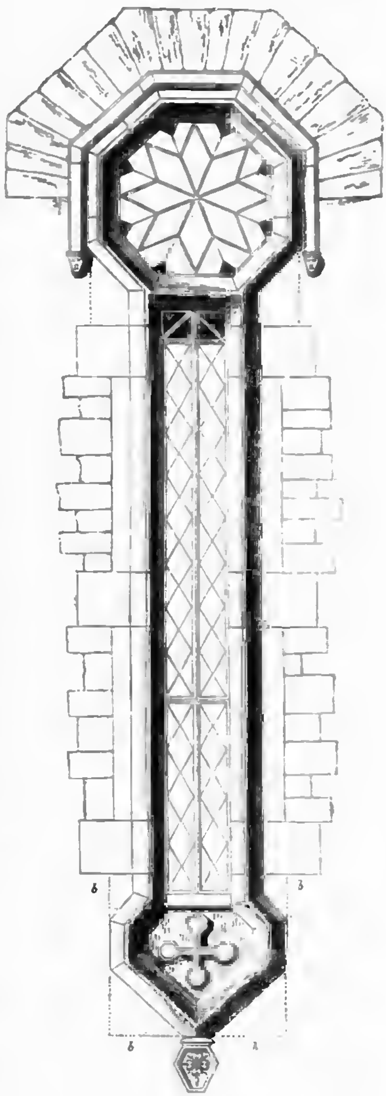
The hood-moulding projects before the face of the octagonal champhered head (samaas jambs), see *x x*, about 5 inches.

Your obedient, J. K. L.

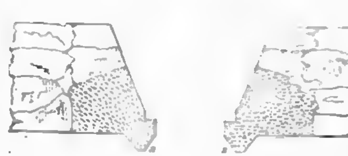
Gorey, 3rd February, 1844.

[We think this window would better suit a lodge than a church. —ED.]

DESIGN FOR A NARROW WINDOW.



ELEVATION.



PLAN.

SCALE. 12 ins. 0 1 2 3 4 5 FEET.